Title: A Day in Elapsed Time

Brief Overview:

This unit addresses elapsed time on the hour. Students will need to be familiar with analog as well as digital clocks, be able to read and write time displayed on an analog clock face, and know the difference between a.m. and p.m. to be successful with this unit. The unit's main focus is on estimating the duration of various activities and using number lines to calculate elapsed time. On day three of the unit students will work cooperatively to create a class schedule using these focus skills.

NCTM Content Standard:

In grade 2 all students should use tools to measure and develop common referents for measures to make comparisons and estimates.

Grade/Level:

Grades 2-3

Duration/Length:

Three 60 minute lessons

Student Outcomes:

Students will:

- Tell time to the nearest 5 minutes using an analogue and digital clock.
- Estimate the duration of activities.
- Calculate elapsed time to the nearest our in order to determine start and end times.

Development/Procedures:

Materials and Resources:

Day 1

- *Pre-assessment*
- *Pre-assessment Key*
- *Time Cards*
- *Activity Pictures*
- *Draw the Rule*

- Stop Watches
- *Timing Our Activities*
- *Day 1 Exit Ticket*
- *Day 1 Exit Ticket Key*

Day Two:

- 2 class number lines with the numbers 1-12 (teacher created)
- Two large different colored counters (teacher created to match student counters)
- *Activity Pictures* from Day 1
- *Number Lines* (student resource)
- A set of two different colored counters for each student
- Colored Pencils
- 12 sided dice or 12 space spinner
- 6 sided dice
- *Rolling Elapsed Time Directions*
- *Rolling Elapsed Time Table*
- Classroom computers
- *Day 2 Exit Ticket*
- *Day 2 Exit Ticket Key*

Pre-assessment

- Students complete the student resource: *Pre-Assessment*
- Two review questions are provided to ensure that students have the pre-requisite skills needed for this unit. An answer key is provided.

Engagement

- Give each student a time card from student resource: *Time Cards*. Keep one card for yourself.
- Students take 1-2 minutes to read their cards and share with a partner.
- Hold up your card and state the time the clock shows.
- Ask students if they think they have the card that matches yours and hold it up.
- After discussing why the times match give the student with the matching card a new card, so they can complete the activity with the other students.
- Explain to students that each card should have a partner somewhere in the room.
- Give students time to find their partner and discuss why they match.
- Have a few partners share and explain their thinking.

Exploration

- Create a chart that has a likes column and a dislikes column.
- Place two activity pictures from teacher resource: *Activity Pictures (You may wish to enlarge the pictures for whole class use)* in each column according to the rule, "I like activities that take less than 10 minutes" **Do not tell students the rule at this time**.

- Hold up another picture and ask students if they think you like or dislike this activity, having them defend each answer. Allowing students to place a card in the incorrect column is part of the process.
- Students may suggest a picture be moved if they can defend their thinking.
- Repeat this process until students generate the rule, "I like activities that take less than 10 minutes."
- Move all of the cards outside of the columns.
- Allow students to think-pair-share new ways to organize these activities to create a new rule. Allowing them to share a few.

Explanation

- Create a chart with the following headings: Seconds, Minutes, Hours.
- Write and explain an example for each category. (ex. Seconds = snapping your fingers, minutes = washing hands, hours = watching a movie)
- Give students a minute to think about activities for the chart.
- Students discuss their responses with their team. Record student responses on the chart. Some possible answers include: seconds = sneeze, pick your nose, rock-paper-scissors; minutes = to walk to school, draw a picture, play heads up-7 up; hours = a school day, a football game, a trip to an amusement park)
- Students must explain why their activity fits in the column they chose.

Extension

- Students complete student resource *Draw the Rule*, drawing examples and non-examples for the rule, "I like activities that take more than 1 hour." They should also provide a caption for each picture.

Differentiation

- Reteach
  - Students work with a partner to complete student resource: *Timing Our Activities*.
  - They will need stopwatches to time themselves doing each listed activity after they make an estimate.
  - Partners complete their own chart so that each has a turn to time and a turn to record.

- Enrich
  - Students will rearrange the activity cards from teacher resource: *Activity Cards* to find as many rules as possible.

Evaluation

- Have students complete student resource: *Day 1 Exit Ticket*. An answer key is provided.

Day 2

Engagement

- Create a large number line at the front of the class that runs from 1-12 (to represent the hours) that can be colored.
- Have students tell you what it is and how we can use it**.**
- Ask for a number that is less than 6.
- Invite a student to come stand on that number.
- Now have that student make 2 jumps forward.
- Ask the class what they just showed. Possible answers: made two jumps, counted forward by two, or added two.
- Repeat a few more times with both forward and backward jumps.

Exploration

- Ask students why we would be using a number line when our lessons so far have been about time.
- Guide students to the understanding that number lines can be used to represent time.
- Have students repeat the process from the engagement, having them describe what's happening using the terms 1 hour has passed or 1 hour before instead of 1 jump, plus or minus one.
- When a student has a problem where they need to jump past twelve ask students what happens when we reach 12 on the clock. Possible answers: 13 (student may have this misconception due to the number line), start back at 1. You may want to cut small incisions into the number line at intervals allowing you to bend it into a circle, creating the clock face.
- Add a second number line, end to end, with 1 following 12 showing a.m. and p.m.
- Ask students how we can distinguish between a given number on the first number line and that same number on the new number line. Possible answer: using a.m. and p.m.
- Tell students that we want to color all the a.m. hours one color and the p.m. hours another so we can see them clearly. The class should all use the same colors and these colors should be different from the colors of the counters you will use later.
- **Caution**: The first 12 represents 12:00 p.m. and should be colored in the p.m. color. Students may struggle with this.

Explanation

- Introduce the vocabulary elapsed time. Explain to students that when they find the amount of time that has passed they are finding elapsed time.
- Show students the picture of the baby napping from teacher resource: *Activity Pictures*.
- Explain that if the baby took a one hour nap and we know what time the baby went to sleep we can figure out what time she woke up.
- Have a student give you a time for the baby to lie down, be sure they distinguish between a.m. and p.m.

- Place one of the colored counters over the student's number on the class number line, explaining that this is the start time. (We suggest using one light color counter and one red counter. So they are easy to tell apart and you can use red for the end or stopping time).
- Count forward one hour and place the other colored counter on the end time.
- Show students how counting the jumps taken from the starting counter to the ending counter will equal the elapsed time.
- Give students number lines from student resource: *Number Lines* and two different colored counters that match your model.
- Allow students time to color their number lines to match the class number line. Remind them about the tricky twelves.
- Do several examples where students can work along with you. Vary your examples to include different lengths of the nap, different start times, and working backwards from the end time. Some examples include:
    - The baby laid down for a 3 hour nap at 10:00 a.m. what time did she wake up?
    - If the baby woke up from a 2 hour nap at 12:00 p.m. what time did she go to sleep?
- Gradually release responsibility until students are finding the elapsed time independently.

Extension

- Students will use their number lines and counters to complete student resource: *How Long?*

Differentiation

- Reteach
    - Students will work with a partner placing their number lines together creating a double line.
    - Ask students why they would do this? Review that we are now looking at a full day or 24 hours.
    - Read student resource: *Rolling Elapsed Time Directions* with students.
    - Model at least two rounds of the game. One working forward from the start time and one working backwards from the end time.
    - Allow students to play the game giving them a copy of student resource: *Rolling Elapsed Time Table* and different colored pencils to record their results.

- Enrich

    - Show students the elapsed time calculator on the following website: http://www.mathcats.com/explore/elapsedtime.html
        - Each of the times in the calculator show the times to the nearest tenth. Take the time to explain that the digits after the decimals

show a part of the time just like the digits after the decimal in money show part of a dollar.
- Students explore the calculator and should use some of the ideas found below the calculator in their exploration.

Evaluation (Ongoing formative assessment for Day 2)
- Students complete student resource: *Day 2 Exit Ticket*. An answer key is provided.

Day 3

Materials and Resources:
- Student Resource: *Class Schedule Rubric*
- Student Resource: *Class Schedule Template*
- A copy of your school day written in the *Class Schedule Template*

Engagement
- Have students look at your class schedule that is written in the *Class Schedule Template*.
- Make a list of the subjects and activities that the students see in your school day.
- Explain to them that you write the class schedule before they arrive.

Exploration
- Use the questions below to guide a class discussion on how to plan a school day, charting student responses as you go.
  Ask students:
  - What do I have to consider when writing our class schedule?
    Possible answers include: What subjects we will learn that day, how many hours they are at school, if there are any special activities that day.
  - What did I have to know about time to plan this event?
    Possible answers include: How long each subject or activity is, the total number of hours in a day, etc.
  - Did I have to think about elapsed time?
    Possible answers include: Yes, because you have to find elapsed time to write the end time for each subject.

Explanation
- Give students a copy of student resource: *Class Schedule Template.* Explain that this is a guide that helps you write the class schedule each day.
- Grade the model class schedule using student resource *Class Schedule Rubric*.
- Write a new schedule with students. For this schedule add a 2 hour event but do not extend the total number of hours.
- Use the student check list on the rubric as you model.

Extension

- Students work in mixed ability partners to write their ideal school day.
- Students must follow the rubric from student resource: *Class Schedule Rubric,* to receive full credit for this activity.

Differentiation

- Reteach
  - Circulate and support students who may be having difficulty.
  - Have time lines and counters from Day 2 student resource: *Number lines* available for support.

- Enrich
  - Have partners that finish early write a story from the perspective of a student during the school day they scheduled.

Evaluation

- Monitor student performance on extension activity.

Day 4

Materials and Resources:

- Student Resource: *Post-Assessment*
- Teacher Resource: *Post-Assessment Key*

Summative Assessment:

This assessment has two questions for each concept. These questions are in both selected response and constructed response format.

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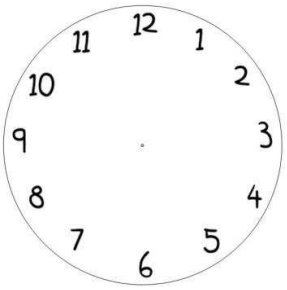
Name _____

Date _____

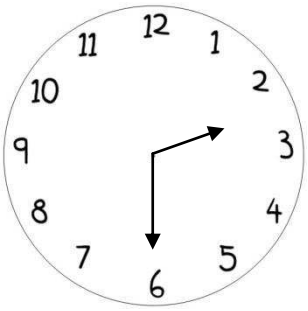
Pre-Assessment

1. Draw the hands on the clock face to make it match the time on the digital clock.



4:50

2. Circle the digital clock that matches the analog clock below.



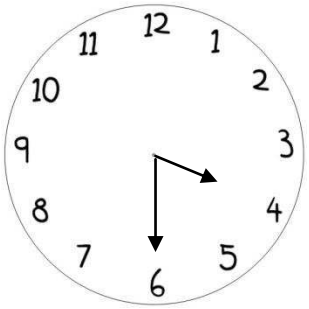
2:30

5:30

6:10

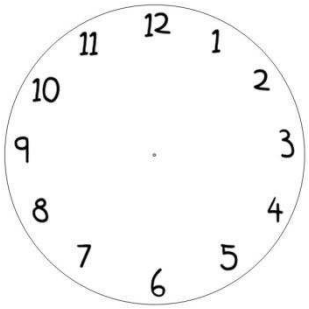
7:15

3. Start Time



Draw the hour and minute hand on the end time clock face to show the time 4 hours later.

End Time



Circle about how long it will take to do each activity below.

4. 

3 seconds 3 minutes

3 hours 3 days

Washing your hands

5. 

6 hours 2 hours

24 hours 4 hours

Watching a movie

6. Nathan and his mom are baking cupcakes for his birthday. The cupcakes take 1 hour to bake. They put the cupcakes in the oven at 4:15 p.m. What time will the cupcakes be ready?

_____

_____

_____

_____

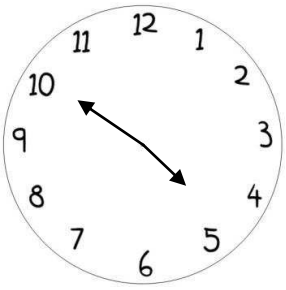
_____

Name _____

Date _____

Pre-Assessment (KEY)

4. Draw the hands on the clock face to make it match the time on the digital clock.



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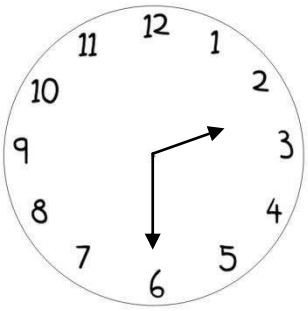
5. Circle the digital clock that matches the analog clock below.



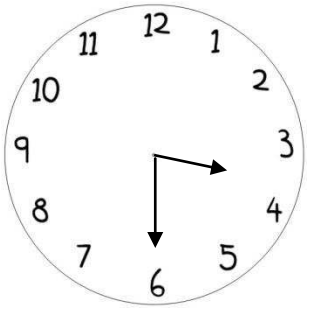
2:30

5:30

6:10

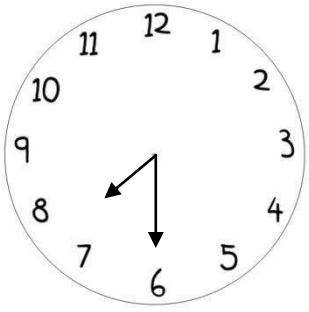
7:15

6. Start Time



Draw the hour and minute hand on the end time clock face to show the time 4 hours later.

End Time



Circle about how long it will take to do each activity below.

4. 

Washing your hands

3 seconds

(3 minutes)

3 hours

3 days

5. 

Watching a movie

6 hours

(2 hours)

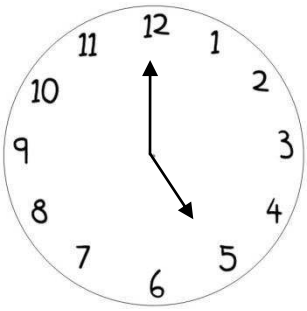
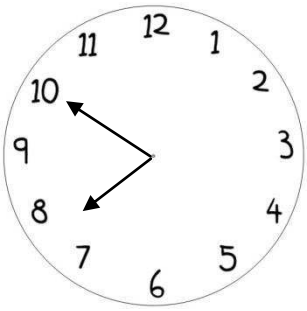
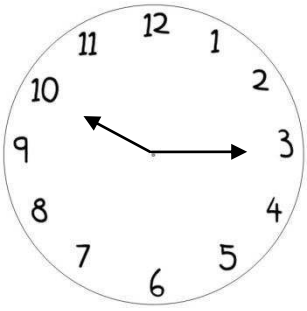
24 hours

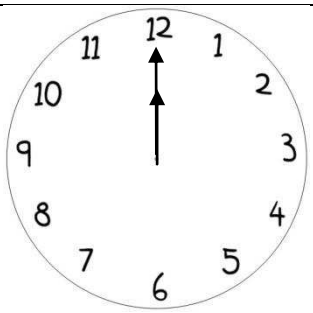
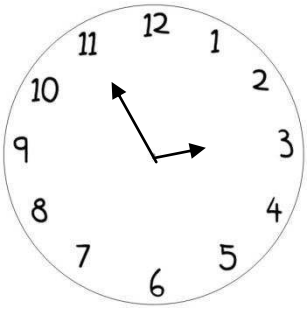
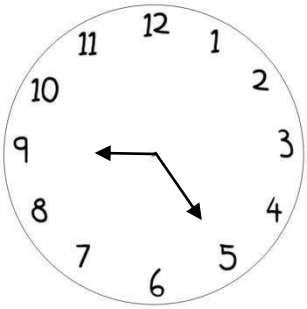
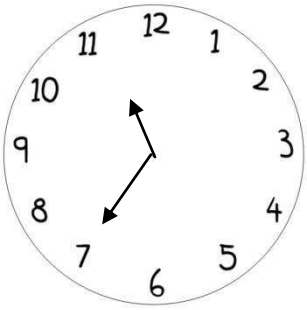
4 hours

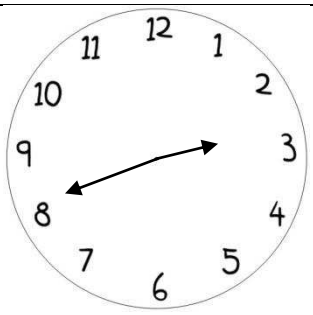
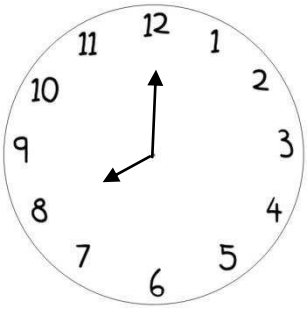
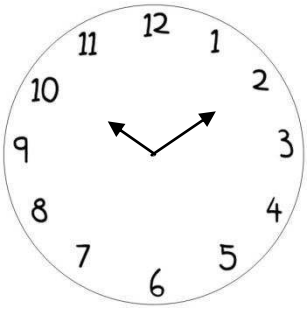
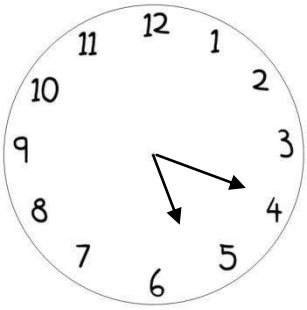
6. Nathan and his mom are baking cupcakes for his birthday. The cupcakes take 1 hour to bake. They put the cupcakes in the oven at 4:15 p.m. What time will the cupcakes be ready? Use words, pictures, and numbers to explain how you found your answer.

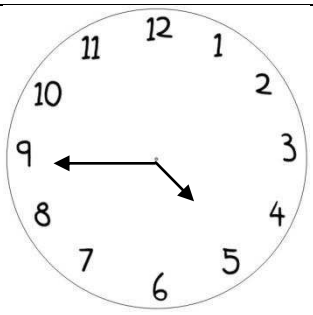
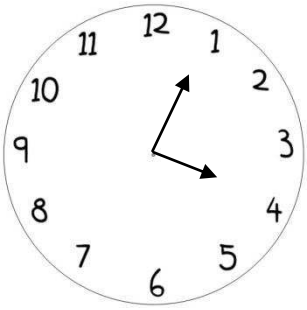
5:15 p.m. explanations will vary

Time Cards

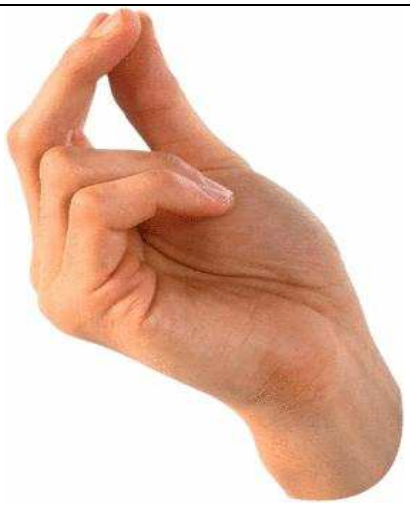
	5:00
	7:50
	10:15

	12:00
	2:55
	9:25
	11:35

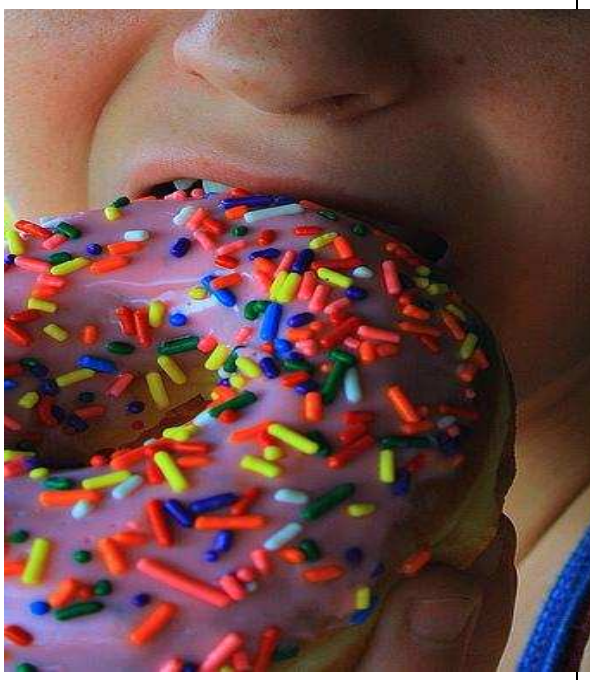
	2:40
	8:00
	10:10
	5:20

	4:45
	4:05

Activity Pictures



School Morning Announcements



Name _____ Date _____

Draw the Rule

Rule: I only like activities that take more than 1 hour.

Using the rule above, draw no less than 3 activities that fit the rule in the like column and no less than 3 activities that do not fit the rule in the dislike column. Be sure to add a caption to each picture.

Like	Dislike

Name _____ Date _____

Timing Our Activities

Write your estimate (best guess) for how long you think it will take you to do each activity under the "Estimated Time" column. Then work with a partner to time how long it takes you to actually do each one. Record your results under "Actual Time."

Activity	Estimated Time	Actual Time
Clap your hands 3 times		
Find page 340 in your math book		
Sharpen a new pencil with a hand sharpener		
Sing Twinkle Twinkle Little Star		

Day 1 Exit Ticket

1.) About how long would it take to play a game of football?

a.) About 1 second
b.) About 1 hour
c.) About 1 day
d.) About 1 minute

2.) Tell an activity that would take about 5 minutes to do.

Day 1 Exit Ticket

1.) About how long would it take to play a game of football?

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d.) About 1 minute

2.) Tell an activity that would take about 5 minutes to do.

Day 1 Exit Ticket – Answer Key

1.) About how long would it take to play a game of football?

a.) About 1 second

(b.) About 1 hour

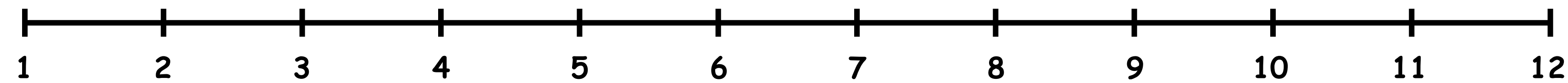
c.) About 1 day

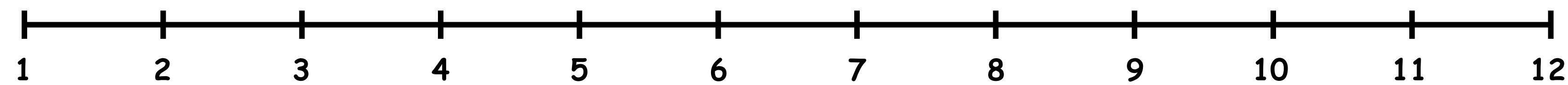
d.) About 1 minute

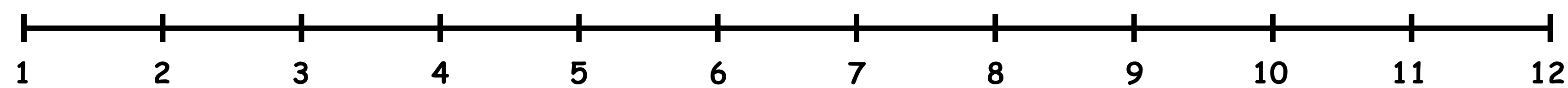
2.) Tell an activity that would take about 5 minutes to do.

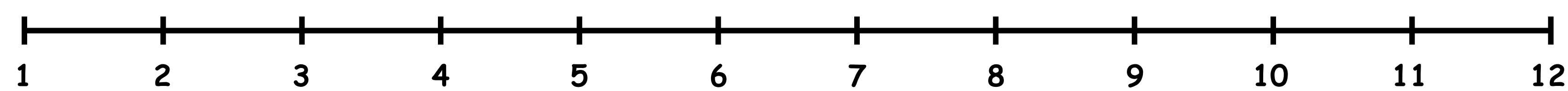
Answers will vary.

Number Lines









Rolling Elapsed Time Directions

Materials:

- Two number lines 1-12
- One 6-sided die
- One 12-sided die or 12 space spinner
- Two different color counters
- Rolling Elapsed Time Table
- 2 different colored pencils (one for each partner)

Directions:

1. Put the two number lines together end to end.
2. Label the left number line a.m. and the right number line p.m.
3. Each player should take a different colored pencil.
4. Both partners roll the 12-sided die or spin the spinner.
5. The partner with the greatest outcome records first.
6. The partner whose outcome was less takes their turn.
7. Begin each turn by rolling the 12-sided die or spinning the spinner.
8. Place one counter on the right-hand (a.m.) number line over the number.
9. Next roll the 6-sided die to see how much time has passed.
10. Count the number of jumps on your die and cover the end time with the other counter.
11. When you record the start time, the elapsed time, and end time use your colored pencil. So that every other turn is in a different color.
12. Once you and your partner agree on the values in your table switch roles and repeat steps 7-10.

*** When you are ready for a challenge, you can play the game in reverse. Start by placing your counter on the number line to the right (the p.m. number line) and then count backwards to find your start time.**

Rolling Elapsed Time Table

Start Time	Elapsed Time	End Time

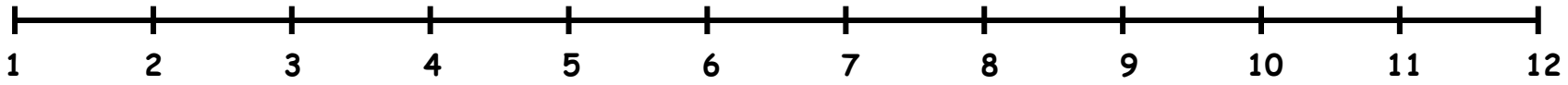
Name: _____ Date: _____

Day 2 Exit Ticket

Alicia and her family went to the movies. The movie started at 3:00. The movie ended at 5:00. How long was the movie Alicia and her family saw? Write your answer and use the number line below to show how you solved it.

_____

_____

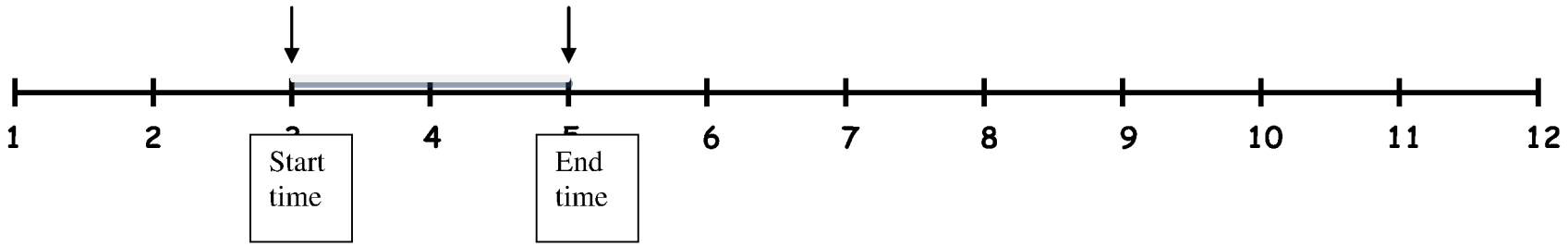


Name: _____ Date: _____

Day 2 Exit Ticket

Alicia and her family went to the movies. The movie started at 3:00. The movie ended at 5:00. How long was the movie Alicia and her family saw? Write your answer and use the number line below to show how you solved it.

2hours; explanations will vary



Names: _____ Date: _____

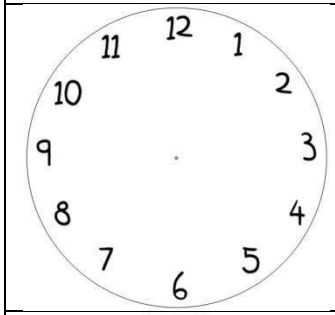
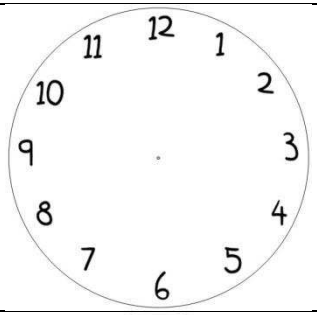
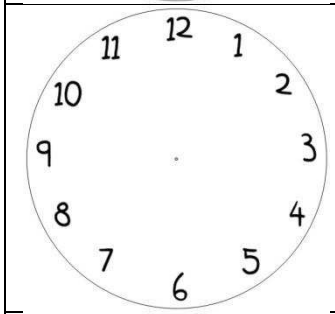
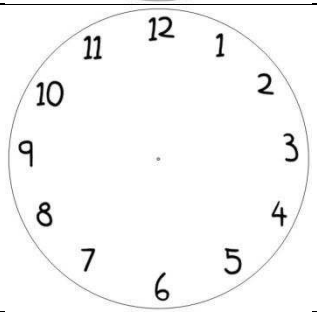
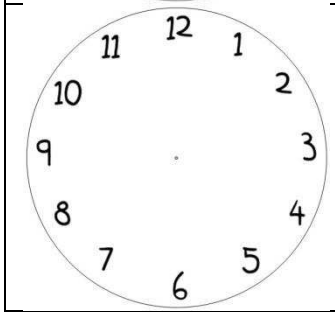
Class Schedule Rubric

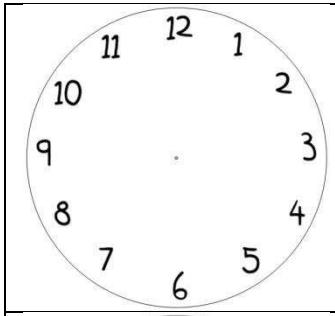
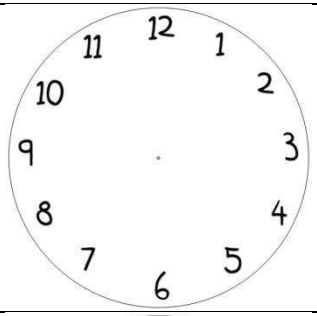
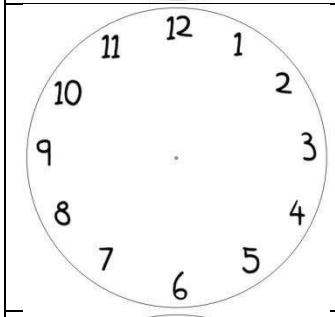
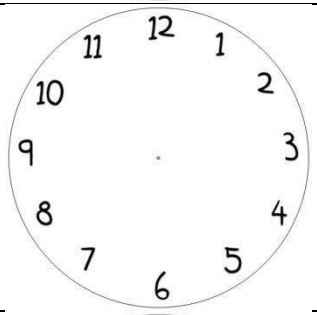
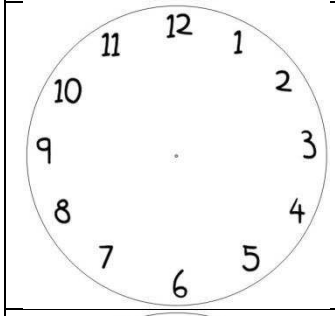
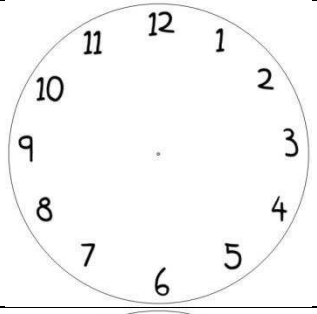
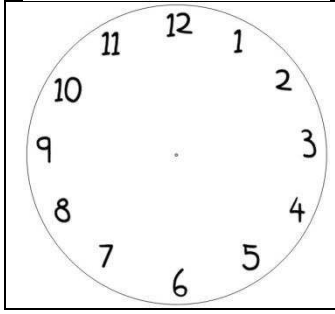
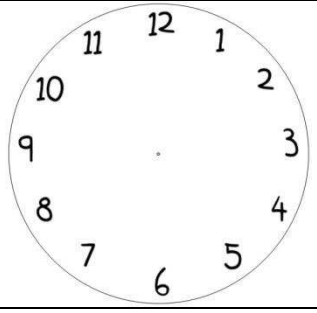
Requirements	Possible points	Student Checklist	Final Score	Teacher Comments
Names	1 pt.		/1	
Clock hands correctly drawn	10 pts.		/10	
Schedule is 7 hours long	5 pts.		/5	
Includes all required subjects/activities	5 pts.		/5	
No subjects are less than 1 hour	5 pts.		/5	
Elapsed time is written correctly.	10 pts.		/10	
Neatness	2 pts.		/2	

Name: _____ Date: _____

Class Schedule Template

Directions: Create a class schedule using the Class Rubric.

Start Time	End Time	Subject/Activity	Elapsed Time
			
			
			

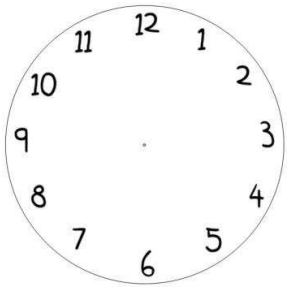
			
			
			
			

Name _____

Date _____

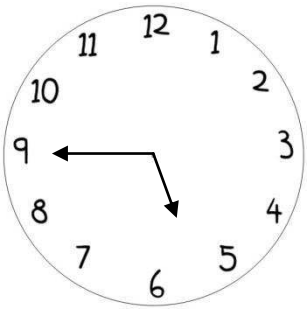
Post-Assessment

7. Draw the hands on the clock face to make it match the time on the digital clock.



8:20

8. Circle the digital clock that matches the analog clock below.



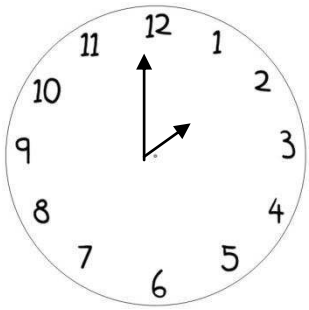
3:45

5:45

9:25

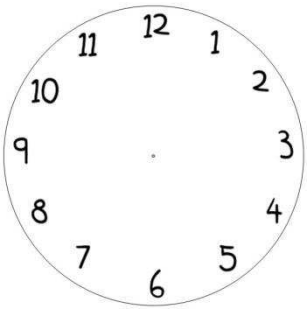
1:40

9. Start Time



Draw the hour and minute hand on the end time clock face to show the time 8 hours later.

End Time



Circle about how long it will take to do each activity below.

10.

Sneezing

1 month 1 minute

1 hour 1 second

11.

Playing a game of basketball

8 hours 2 hours

4 hours 48 hours

6. Victoria has a 3 hour basketball practice on Wednesday. Her practice ends at 6:00 p.m. What time did her practice begin? Draw a picture and use words to explain how you found your answer.

_____

_____

_____

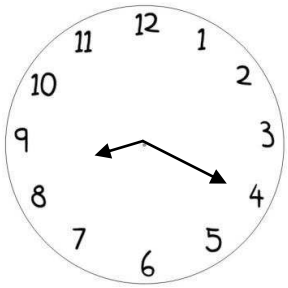
_____

Name _____

Date _____

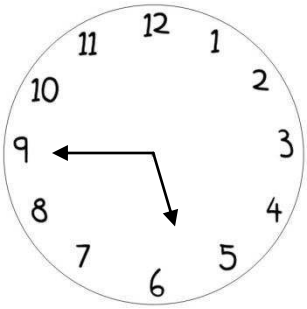
Post-Assessment Key

12. Draw the hands on the clock face to make it match the time on the digital clock.



8:20

13. Circle the digital clock that matches the analog clock below.



3:45

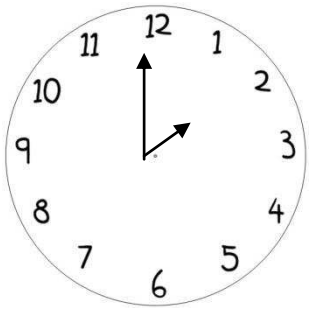
5:45

9:25

1:40

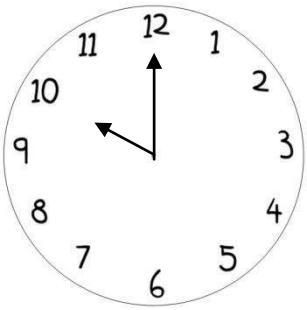
14.

Start Time



Draw the hour and minute hand on the end time clock face to show the time 8 hours later.

End Time



Circle about how long it will take to do each activity below.

15.

Sneezing

1 month

1 minute

1 hour

(1 second)

16.

Playing a game of basketball

8 hours

(2 hours)

4 hours

48 hours

6. Victoria has a 3 hour basketball practice on Wednesday. Her practice ends at 6:00 p.m. What time did her practice begin? Draw a picture and use words to explain how you found your answer.

3:00 p.m. explanations will vary